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# NEW, RARE OR LITTLE-KNOWN SCOMBROIDS. No. II.

BY HENRY W. FOWLER.

## CARANGIDÆ.

### SCOMBEROIDINÆ.

### SCOMBEROIDES Lacépède.

Hist. Nat. Poiss., III, 1802, p. 50 (*noelii*).

Dorsal spines I, VII. Pterygoid teeth present.

### Subgenus SCOMBEROIDES Lacépède.

Scales shorter, not very elongate, or more normally developed.

**Scomberoides toloo** (Cuvier).

*Chorinemus toloo* Cuvier, Hist. Nat. Poiss., VIII, 1831, p. 277. Malabar. (M. Bélenger.) (Based on *Toloo parah* Russell, Fishes of Coromandel, II, 1803, p. 29, Pl. 137. Vizagapatam.)

Head $4\frac{3}{4}$; depth $3\frac{1}{6}$; D. I, VII–I, 20; A. II–I, 18; P. ii, 15; V. I. 5; width of head $2\frac{2}{5}$ in its length; depth of head $1\frac{1}{5}$; mandible $1\frac{3}{5}$; fifth dorsal spine $5\frac{1}{8}$; first dorsal ray $1\frac{3}{7}$; first anal spine $4\frac{1}{4}$; least depth of caudal peduncle $4\frac{1}{6}$; pectoral $1\frac{1}{2}$; ventral 2; snout $3\frac{4}{5}$, from tip of upper jaw; eye 4; maxillary $1\frac{2}{3}$. Gill-rakers 3+9, compressed, pointed, and with fine bristles on inner edges. Longest about $\frac{2}{3}$ of longest filaments. Longest filaments about $\frac{3}{4}$ of orbit. Color when fresh in arrack slaty-gray above, sides and lower surface silvery-white. Top of head, snout, and upper marginal portion of back grayish. On sides a little above, about six daubs or blotches of grayish. Soft dorsal dull or pale yellowish-white on basal portion, upper part grayish. Ventral and anal similar. Axil of pectoral dusky. Iris pale yellowish. Peritoneum whitish. Length 13 inches. Four examples, one now in Stanford University. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller.

**Scomberoides moluccensis** (Gray).

*Thynnus moluccensis* Gray, Cat. Fish Gronow Brit. Mus., 1854, p. 121. Insulas Moluccenses. (British Museum.)

*Chorinemus sancti petri* Bleeker, Verh. Bat. Genoot. (Bijd. Makreel. Vissch. Soend. Moluk. Arch.), XXIV, 1852, p. 45.——Günther, Cat. Fish. Brit. Mus., II, 1860, p. 473.——Günther, Journ. Mus. Godef. (Fische der Südsee), V, 1876, p. 138. (Part. Not of Cuvier.)

Head $4\frac{1}{3}$; depth $3\frac{1}{2}$; D. I, VII–I, 20; A. II–I, 18; P. ii, 16; V. I, 5;

width of head 2½ in its length; depth of head 1⅓; mandible 1½; first dorsal ray about 2; first anal ray about 2⅕; upper caudal lobe 1¼; pectoral 1⅔; ventral 1⅚; snout 3¾ in head, measured from its tip; eye 4; maxillary 1⅘; interorbital space 3½; least depth of caudal peduncle 4⅗; sixth dorsal spine 4.

Body rather elongate, somewhat oblong-ovate, strongly compressed, and greatest depth about opposite origin of soft dorsal. Profiles nearly straight after origins of soft dorsal and anal. Caudal peduncle slender, compressed, and its least depth about half of its length.

Head rather small, compressed, upper profile but little inclined, and nearly straight till a little before spinous dorsal. Lower profile rather convex from tip of mandible. Snout rather short, a trifle longer than eye, rather narrow, convex, and tip of upper jaw rather pointed. Eye circular, lower rim well below in greatest depth, and posterior rim a little posterior in length of head. Mouth large, gape reaching about opposite front rim of pupil, and tip of mandible produced a little in front beyond tip of upper jaw. Preorbital narrow. Maxillary long, narrow, its distal expanded extremity equal to about ⅔ of pupil, and reaching about opposite first ⅗ of orbit. Mandible curved up a little in front. Teeth small, strong, and a single series of rather enlarged ones in upper jaw, especially in front. Front of upper jaw with patch of fine teeth inside and along edges, but narrowing posteriorly. Teeth biserial in mandible, those of outer series very small, close together, and directed outwards. Teeth of outer series of upper jaw fitting in between the two mandibular series when mouth is closed. Four slightly enlarged canine-like teeth in front of lower jaw in inner series. Patches of small teeth on vomer, palatines and pterygoids,

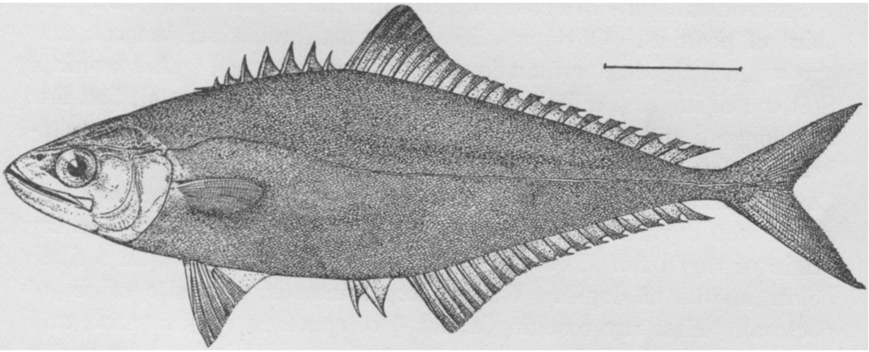

Fig. 1.—*Scomberoides moluccensis* (Gray).

that of former without backward elongation. Tongue small, a little elongate, rounded, and free in front. Tongue and basibranchials with fine asperous patches. Nostrils adjoining, level with upper part of iris, posterior a little larger, and without flap in front. Interorbital space elevated and a median trenchant keel extending from internasal space to spinous dorsal.

Gill-opening extending forward a trifle before front rim of orbit. Rakers 9+16, slender, compressed, pointed, and longest equal to filaments which are about 3/5 of orbit. Pseudobranchiæ small. Isthmus strongly compressed but its edge rounded.

Scales small, elongate, not narrowly so, and not on head and fins, except base of caudal. Lateral line a little wavy at first, becoming straight after origin of soft anal. Axillary cavities at bases of pectoral and ventral. Each dorsal and anal spine depressible in a groove.

First dorsal spine directed forward, and its tip about opposite first third of pectoral. Of depressible spines fifth and sixth longest, and seventh a little shorter than fourth. When depressed spines overlap. Soft dorsal inserted a little nearer snout than base of caudal, first few rays longest, and about last eleven finlet-like though joined by a membrane. Soft anal inserted behind origin of soft dorsal and fin similar. Caudal forked, lobes pointed, and rather slender. Spinous anal inserted well beyond tip of pectoral, second spine longest and reaching origin of rayed fin. Pectoral broad, short, and origin of fin a little below middle of depth. Ventral large, inserted opposite origin of pectoral. First ray reaching about 2/3 of space to spinous anal, and innermost joined to abdomen by a membrane. Spine slender and a little over half of length of fin.

Color in alcohol pale brownish-drab-gray above, side and lower surface silvery-white. Side of head silvery. Fins pale straw-brownish, ends of caudal lobes a little darker, and upper portions of soft dorsal rays deep brownish-black. Ventral and anal whitish. No blotches apparent on side of trunk. Iris pale brassy. Peritoneum whitish.

Length 6¼ inches.

No. 11,328, A. N. S. P. One example from Christmas Island, lat. 1° 59′ N., long. 157° 32′ W., Polynesia. Dr. William H. Jones.

One from Manila, Philippine Islands, from Dr. M. Burrough, differs a little as follows: Head 4½; depth 3 3/7; width of head 2 2/5 in its length; depth of head 1⅔; mandible 1⅗; pectoral 1½; ventral about 2; snout 3½ in head, measured from tip of upper jaw. Maxillary reaching a little nearer posterior rim of orbit. Length 6⅛ inches.

Also two examples, probably from Polynesia. They agree in most all details. One is very young, measuring 2½ inches. It has: Head 3½; depth 3⅖. Body strongly compressed, and of more fusiform profile. Spines large, fifth longest. Second anal spine reaching past origin of soft anal fin which is inserted a little behind that of soft dorsal. Ventral equally as long as pectoral, and reaching a little beyond anus, but not quite to origin of spinous anal. Pectoral broad.

*Scomberoides toloo-parah* (Rüppell)[1] from the Red Sea needs comparison. The synonomies of the species of *Scomberoides* appear to have been greatly confused. Gray's *moluccensis* seems to be the oldest name available for the East Indian form, with which I also identify that from Polynesia.

### RHAPHIOLEPIS subgen. nov.

Type *Chorinemus tol* Cuvier.

Scales elongate and slender. Approaching *Oligoplites*.

(*'Ράφιον*, a small needle; *λεπίς*, a scale.)

**Scomberoides tol** (Cuvier).

*Chorinemus tol* Cuvier, Hist. Nat. Poiss., VIII, 1831, p. 283. Pondichéry. (M. Leschenault.) La côte de Malabar. (MM. Dussumier et Bélenger.) Amboine. Ile de Bourou. (MM. Quoy and Gaimard.) (Probably not *Tol parah* Russell.)

Head 4¾; depth 4; D. I, VII–I, 20; A. II–I, 19; P. II, 15; V. I, 5; width of head 2⅓ in its length; depth of head 1⅖; least depth of caudal peduncle 5; pectoral 1$\frac{4}{15}$; ventral 2; snout 3½, from its tip; eye 4⅔; maxillary 2; interorbital space 3⅔. Gill-rakers 8+18, compressed, slender, pointed, with minute bristles on their inner surfaces and longest nearly equal to longest filaments. Color when fresh in arrack rich slaty-gray above, deep or blackish along profile of back, and a deep blackish streak above eye along side of head above till over base of pectoral. Sides of body and lower surface silvery-white with about five distinct pale gray blotches anteriorly. Spinous dorsal gray-black. Soft dorsal dull or pale yellowish-white, except upper or outer portions of anterior rays which are black. Caudal grayish. Anal, pectoral and ventral whitish. Axil of pectoral blackish. Iris pale yellowish. Peritoneum pale or whitish. Length 9 inches. One example from Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller.

Russell's poor figure[2] cannot be certainly identified with this species.

**Oligoplites saurus** (Schneider).

*Scomber saurus* Schneider, Syst. Ichth. Bloch, 1801, p. 32. Jamaica. (Based on Browne.)

Fort Macon (North Carolina), Key West (Florida). Young examples from Porto Rico (Coll. U. S. Fish Com.) about $4\frac{1}{2}$ inches long are more slender, the depth usually about $3\frac{7}{8}$, and the maxillary falling a little short of posterior margin of eye. At present, in alcohol, the iris is dilute silvery-white. The colored figure given by Messrs. Evermann and Marsh[3] unfortunately lacks the spinous dorsal and anal fins.

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[1] *Lichia toloo-parah* Cuvier, in Rüppell, *Atlas zu der Reise im nördlichen Afrika*, Zool., 1828, p. 91. Massaua.

[2] *Tol parah* Russell, *Fishes of Coromandel*, II, 1803, Pl. 138.

### Oligoplites saliens (Bloch).

*Scomber saliens* Bloch, Naturg. Ausl. Fisch., VII (X), 1793, p. 49, Pl. 335. Bey den antillischen Inseln.

Head $4\frac{4}{5}$; depth $3\frac{2}{5}$; D. I, IV–I, 20; A. II–I, 20; P. III, 14; V. I, 5; width of head about $2\frac{1}{10}$ in its length; depth of head over posterior margin of eye $1\frac{1}{5}$; mandible $1\frac{4}{7}$; second articulated dorsal ray $1\frac{1}{2}$; first articulated anal ray $1\frac{3}{4}$; pectoral $1\frac{1}{3}$; ventral $2\frac{3}{7}$; snout $3\frac{4}{5}$ in head, measured from its own tip; eye 4; maxillary $1\frac{4}{7}$; interorbital space 4; last dorsal spine 4; second anal spine $4\frac{3}{4}$; least depth of caudal peduncle $4\frac{2}{5}$.

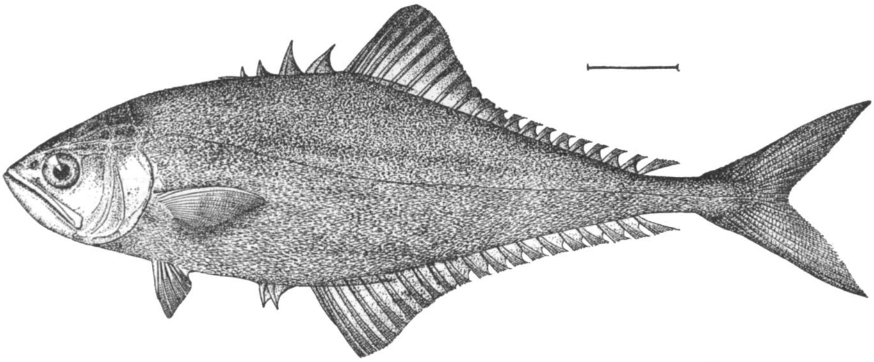

Fig. 2.—*Oligoplites saliens* (Bloch).

Body deep, compressed, oblong-ovoid, and greatest depth at origin of rayed anal. Profiles similar, more or less straight to caudal peduncle after origins of soft dorsal and anal. Caudal peduncle rather slender, compressed, and its least depth about $2\frac{1}{6}$ in length.

Head deep, compressed, upper profile nearly straight, and lower about evenly convex from tip of mandible to gill-opening. Snout short, convex, a little broad, and upper jaw a little pointed in front. Eye circular, lower rim a little below greatest depth and posterior rim about midway in head. Mouth large, gape reaching about opposite middle of orbit, and tip of mandible produced a little beyond tip of upper jaw. Preorbital narrow. Maxillary long, narrow, its distal expanded extremity equal to about $\frac{2}{3}$ of pupil, much inclined and reaching well beyond posterior margin of orbit. Teeth small, strong, somewhat slender, pointed, uniserial in upper jaw and biserial in lower. Outer series of mandible directed somewhat outward so that those of upper fit in between. Patches of minute teeth on vomer and palatines, none on pterygoids. Patch on vomer more or less rounded in shape and without backward prolongation like that in *O. saurus.* Palatine teeth in form of broader patches anteriorly, becoming very narrow posteriorly. Tongue small, broad, rounded, and free in front, its upper surface asperous. Surfaces of basibranchials also asperous. Nostrils adjoining, nearly opposite middle of eye, and also a little nearer same than tip of snout. Posterior a little larger and partly concealed in front by a small flap along edge of anterior. Interorbital space elevated convexly, and with a median trenchant keel extending from internasal space to occiput. Region before spinous dorsal also trenchant.

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[3] *Bull. U. S. Fish Comm.* (Fish. Porto Rico), 1899 (1900), Pl. 7.

Gill-opening extending forward about opposite nostrils. Rakers about $7+16$, slender, and longest a trifle shorter than filaments which are nearly equal to $\frac{3}{4}$ of orbit. Pseudobranchiæ small. Isthmus strongly compressed but edge rounded.

Scales elongate, slender, pointed, and irregularly directed backward. Lateral line curved or wavy at first, becoming somewhat straight along side of trunk opposite rayed dorsal and anal. An axillary cavity at base of pectoral covered over above by a membrane. A similar one at base of ventral. Each spine of dorsal and anal depressible in a deep groove. Head entirely naked.

First dorsal spine directed forward, its tip about opposite middle of pectoral. Dorsal spines separate, each one posteriorly united with back by a membrane, and all graduated to last which is longest. Soft dorsal inserted well behind origin of soft anal, nearly midway between front margin of orbit and base of last dorsal ray. Anterior rays elongate, forming a small lobe, and about last ten finlet-like though united by a membrane. Soft anal similar, inserted about midway between tip of mandible and base of last anal ray. Spinous anal inserted about opposite tip of pectoral, spines nearly equal, united posteriorly with abdomen by a low membrane, also depressible in a groove, and not quite reaching origin of anal when depressed. Caudal moderate, deeply forked, and lobes somewhat slender. Pectoral short, broad, and its insertion nearly level above with lower rim of orbit. Ventral inserted a trifle in advance, inner ray joined to abdomen by a membrane, and depressed fin reaching a little over half way to origin of spinous anal. Ventral spine about half length of fin. Anus a little nearer tip of depressed ventral than origin of spinous anal.

Color in alcohol dull brown above, pale or whitish below. Body over most all of lower region washed with silvery-white. This also includes mandible and side of head. Fins pale straw-brown, ventral and anal paler or whiter. Iris pale brassy. Peritoneum pale.

Length $9\frac{3}{4}$ inches.

No. 11,334, A. N. S. P. One example from Rio Janeiro, Brazil. Drs. Ruschenberger and Turner.

This little-known form is well marked and easily distinguished from *O. saurus* by the longer maxillary and shape of the patch of vomerine teeth. The form called *palometa* is said to have the posterior margin of the infraorbital ring deeply concave. This is not true of my example, as it has the posterior rim of the infraorbital nearly vertical.

## SERIOLINÆ.

**Naucrates ductor** (Linnæus).

*Gasterosteus ductor* Linnæus, Syst. Nat., Ed. X, 1758, p. 295. In Pelago, Satelles Squali.

*Naucrates ductor* Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 72.

Two examples $11\frac{5}{8}$ and $11\frac{3}{8}$ inches in length from the Mediterranean show the following: Head about 4; depth $4\frac{1}{8}$ to $4\frac{1}{6}$; D. III–I, 25 and 26; A. II–I, 16; eye $5\frac{5}{6}$ in head; maxillary 3; interorbital space $2\frac{3}{4}$ and $2\frac{4}{5}$; pectoral about $1\frac{2}{3}$; ventral $1\frac{2}{5}$ and $1\frac{2}{3}$. Bonaparte Coll. Also seven examples from the West Indies, ranging up to $4\frac{3}{8}$ inches in length. The latter has: Head $3\frac{2}{3}$; depth $4\frac{1}{3}$; D. IV–I, 26; A. II–I, 15; eye 5 in head; maxillary 3; interorbital space $2\frac{9}{10}$; pectoral $1\frac{7}{8}$; ventral $1\frac{4}{5}$. The others all more or less agree except that they become shorter and the ventrals of the smaller examples reach the anus. It is $2\frac{3}{16}$ inches in length and bears evidence of the *Xystophorus* stage in the presence of preopercular spines. The largest example noted above agrees perfectly with the large Mediterranean examples in the posterior position of the vent and the slender form of the body. The scales are decidedly small, and approximate about 175 in a lateral series below the lateral line to the base of the caudal.

**Naucrates polysarcus** sp. nov.

Head $3\frac{3}{4}$; depth $3\frac{1}{4}$; D. V–I, 25; A. II–I, 16; P. III, 16; V. I, 5; scales about 120 in a series directly below lateral line to base of caudal; 17? scales between origin of spinous dorsal and lateral line, and about 27? in a vertical series between latter and origin of soft anal; width of head $1\frac{3}{4}$ in its length; depth of head $1\frac{1}{3}$; snout $3\frac{1}{2}$; eye 5; maxillary 3; interorbital space $2\frac{7}{8}$; mandible $2\frac{4}{7}$; second dorsal ray about $2\frac{1}{6}$; least depth of caudal peduncle about 5; first anal ray about $2\frac{1}{2}$; pectoral (damaged) $1\frac{3}{4}$; ventral $1\frac{2}{3}$.

Body plump, robust, compressed, and greatest depth about origin of soft dorsal. Back about latter a trifle elevated. Caudal peduncle rather thick, depressed above and below, and its least depth about $\frac{2}{5}$ its length.

Head robust, plump, compressed, upper profile obtuse in front and convex. Snout broad, convex, and obtuse. Eye circular, not high, and its posterior margin well anterior to middle of length of head. Adipose eyelid not broad. Mouth rather small, and small mandible not produced beyond tip of upper jaw. Maxillary small, reaching front margin of pupil, slipping below preorbital most of its length, and distal expanded extremity equal to diameter of pupil. Teeth fine, small, and in narrow bands in jaws. Vomer and palatines with similar teeth, those on former forming a backward elongation. Tongue rather small, spatulate, free, and with a small asperous patch. Nostrils adjoining, level with upper part of pupil, but a little nearer tip of snout. Posterior with a cutaneous valve in front. Interorbital space broadly convex.

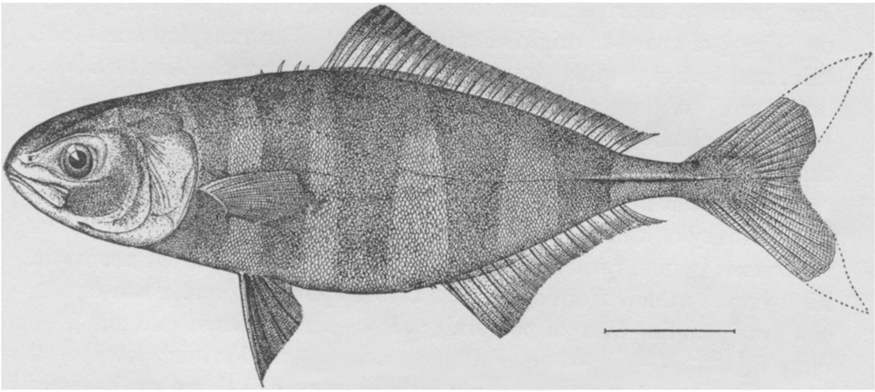

Fig. 3.—*Naucrates polysarcus* Fowler.

Gill-opening extending forward about opposite front rim of orbit. Rakers 6 + 16, compressed, pointed, longest about $\frac{3}{5}$ of orbit or about $\frac{2}{3}$ of longest filaments. Pseudobranchiæ well developed. Isthmus broad and with a median groove.

Scales small, cycloid, and of more or less even size. Cheeks, postocular, supraocular, mastoid, and occipital regions covered with small scales, head otherwise naked. Postocular scales elongate. Opercles striate. A patch of small scales extending along bases of soft dorsal and anal in front. Base and basal region of caudal lobes also covered with small scales. Base of inner ventral ray scaled anteriorly. Lateral line well curved convexly below origin of spinous dorsal, then descending rather steeply till about opposite first third in base of dorsal fin and continuing thence straight to base of caudal. Cutaneous keel along side of caudal peduncle not conspicuous. Tubes of lateral line simple.

Dorsal spines low, third longest and others graduated down. Origin of this fin nearly midway between middle of orbit and origin of soft anal in vertical. Soft dorsal inserted a little nearer tip of snout than base of last dorsal ray, and first ray longest, others graduated down though no lobe is formed. Soft anal similar, inserted far behind anal or about midway between origin of ventral and base of last anal ray. Caudal rather small, forked, and lobes apparently pointed. Pectoral broad, short, origin about level with lower margin of eye. Ventral long, pointed, inserted below bases of lowest or last pectoral rays, and reaching $\frac{2}{3}$ of space to origin of spinous anal. Ventral spine small and thin, and last ray united to abdomen by a membrane. Anus midway between tip of depressed ventral and origin of spinous anal.

Color in alcohol deep brown, back and upper surface darker. Lower surface pale brownish. Fins brownish. Pectoral deep brown. Ventrals with front margins of spine and rays light or pale, rest of fin more or less dusky or dull blackish-brown. Side with five broad deep brown transverse bands, rather regular, and spaces between much narrower. First band extends from space just before spinous dorsal down to side of chest including base of pectoral in its course. Second extends from spinous dorsal. Third extends from bases of anterior long dorsal rays toward vent and tip of ventrals. Fourth extends down on bases of long anterior anal rays. Fifth includes last rays of both dorsal and anal. Base of caudal also of same color. Transverse bands also become paler or more or less fade out below. Iris dull yellowish. Peritoneum pale.

Length (caudal damaged) $6\frac{3}{8}$ inches.

Type No. 11,379, A. N. S. P. West coast of Mexico. Dr. William H. Jones. One example.

This species is provisionally separated from *Naucrates ductor* by the more robust or deeper form of the body, the ventrals reaching back till the front margin of the vent is midway between in the space to the origin of the spinous anal, and the much larger scales.

Dr. Gill first pointed out the differences between this form and *N. ductor*, basing the examination apparently on one of the examples in the Bonaparte collection, now before me, and an example from Honolulu, Hawaiian Islands, sent to the Smithsonian Institution by the Rev. W. H. Pease.[4] From his account the latter example appears identical with my type.

(*Πολύσαρκος*, plump.)

**Elagatis bipinnulatus** (Quoy and Gaimard).

*Seriola bipinnulata* Quoy and Gaimard, Voyage de l'Uranie, Zool., 1825, p. 363, Pl. 61, fig. 3. Îsles des Papous. (M. Taunay.)

Head 4; depth $5\frac{1}{6}$; D. VI–I, 24, 2; A. I, 16, 2; P. III, 16; V. I, 5; scales about 105 in a lateral series to base of caudal; about 12 between origin of dorsal and lateral line; width of head 2 in its length; depth of head $1\frac{3}{5}$; mandible $2\frac{1}{4}$; third dorsal spine $5\frac{1}{2}$; base of spinous dorsal $2\frac{3}{4}$; spine of soft dorsal $4\frac{3}{5}$; first undeveloped dorsal ray $2\frac{3}{5}$; anal spine $7\frac{1}{4}$; first anal ray $3\frac{2}{3}$; least depth of caudal peduncle 5; pectoral $1\frac{7}{8}$; ventral 2; snout $2\frac{3}{5}$, from its tip; eye 6; maxillary 3; interorbital space $2\frac{9}{10}$.

Body elongate, fusiform, slender, and compressed, greatest depth near origin of soft dorsal. Caudal peduncle small, compressed, and its width $1\frac{2}{5}$ in its depth. Tail sloping down gradually. A small pit at origin of each caudal lobe.

Head elongate, subconic, compressed, pointed, and upper profile almost straight from end of snout to occiput. Snout long, pointed, rather broad, and with upper jaw projecting. Eye small, with narrow eyelid, and midway in length of head. Mouth small, slightly curved, and with mandible projecting beyond upper jaw. Maxillary broad posteriorly till equal to $\frac{2}{3}$ of eye, its entire edge slipping under preorbital, and reaching posteriorly half way between nostrils and front of orbit. Lips thick and fleshy, especially lower. Teeth in fine rasp-like bands in jaws, broader anteriorly, but not connected at symphysis or front of upper jaw. Vomer and palatines with patches of fine teeth. Tongue long, free, rather thin, upper surface with numerous small velvety patches, and tip broadly rounded. Nostrils small, lateral, together, and near last third of space between tip of snout and front of eye. Interorbital space broad, and elevated. A broad median ridge from snout to occiput, and also a broad ridge over each eye. Margin of preopercle entire.

Gill-opening extending forward till opposite nostrils. Rakers 9+26, compressed, long, with fine bristles on inner edges, and longest but little shorter than longest filaments. Filaments a little shorter than eye, and pseudobranchiæ about half as long as latter. Branchiostegals 7, large. Isthmus broad, with a shallow groove.

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[4] *Proc. Acad. Nat. Sci. Phila.*, 1862 (1863), p. 441.

Scales small, numerous, irregularly rounded, generally elongate, with imperfect striæ, and not imbricated. Head more or less naked, except on cheeks, occiput, and space back of eyes. Bases of anterior long dorsal and anal rays scaly. Base of caudal scaly. Base of pectoral with minute scales. Lateral line superior at first, extending down to middle of side of tail opposite origin of anal, and then straight to base of caudal.

Dorsal spines small, pungent, third longest and others graduated in front and behind, all depressible in a groove. Insertion of spinous dorsal about over last fifth of pectoral, or nearly midway between front margin of eye and origin of anal. Origin of soft dorsal nearer tip of mandible than base of caudal, first ray highest, and others graduated. Last two rays detached. Anal similar, but smaller, and its origin nearer gill-opening than base of caudal. Caudal deeply forked, lobes long pointed and lower about $3\frac{1}{2}$ in body. Pectoral small, a little larger than ventral, and not reaching as far posteriorly. Origin of ventral a little nearer posterior margin of eye than origin of soft dorsal, rays strong, and reaching half way to anus. Anus about an eye-diameter before origin of anal.

Color when fresh in arrack deep leaden-gray or brownish above, lower parts pale or dirty white. Dorsals and caudal dark like back. Anals pale or whitish, last rays with a grayish margin. Pectoral and ventral grayish, latter with white rays. Lateral line forms a median dark streak along side of caudal peduncle. Iris pale brown. Peritoneum white.

Length $23\frac{5}{8}$ inches.

No. 25,130, A. N. S. P. Padang, Sumatra. One example. Alfred C. Harrison, Jr., and Dr. H. M. Hiller.

The American form[5] needs comparison. It has been considered identical by Lütken,[6] Meek[7] and Bollman.

## CARANGINÆ.

**Megalaspis cordyla** (Linnæus).

*Scomber cordyla* Linnæus, Syst. Nat., Ed. X, 1758, p. 298. "America."
*Megalaspis rottleri* Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 506.

Head 4; depth $4\frac{1}{5}$; D. VIII–I, 11, 8; A. II–I, 9, 7; scales 28 in lateral line, and scutes about 60 to base of caudal; snout $3\frac{3}{4}$ in head, from its tip; eye 5; maxillary 2½; interorbital space 3⅓. Gill-rakers 11+21, long, compressed, and with fine bristles on inner margin. Color when fresh in arrack deep steel-gray on back, side and lower surface of body white. Latter, and especially sides of head and large scutes of lateral line, burnished with bright silvery. Top of head blackish. Upper margin of opercle with a blackish blotch a little smaller than eye. Dorsal, caudal and pectoral grayish, or dusky-black. Anal and ventral chalky-white, outer portions more or less dusky or blackish. After being in alcohol upper surface shows a dark purplish-metallic luster. Length 12½ inches. Four examples in Acad. Nat. Sci. Phila. and Stanford University. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller.

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[5] *Seriola pinnulata* Poey, *Mem. Hist. Nat. Cuba*, II, 1858, p. 233. Cuba.

[6] *Seriolichthys bipinnulatus* Lütken, *Kon. Dansk. Vid. Selsk. Skrift.* (*Spolia Atlantica*), XII, 1880, p. 603.

[7] *Proc. Acad. Nat. Sci. Phila.*, 1889, p. 42.

**Decapterus punctatus** (Agassiz).

*Caranx punctatus* Agassiz, Sel. Gen. Spec. Pisc. Brasil., 1829, p. 108, Pl. 56*a*, fig. 2. Oceano Atlantico [Brazil]. (Museo Monacensi.)

*Decapterus sanctæ-helenæ* Fowler, Proc. Acad. Nat. Sci. Phila., 1899 (1900), p. 118. (Not of Cuvier.)

The three examples that I recorded from Jamaica appear to belong to this species. The largest, 4⅛ inches in length, agrees with the others. It has: Head 3⅔; depth 5; D. VIII–I, 31, 1; A. II–I, 27, 1; P. ii, 18; V. I, 5; scales 55 in lateral line to first keeled scute; keeled scutes 37 in lateral line. Also three examples from the stomach of a horse mackerel (*Pelamys*?) taken at Newport, Rhode Island, by Samuel Powel. The largest of these only measures 4¼ inches. It has: Head 3¾; D. VIII–I, 31, 1; A. II–I, 26, 1; and keeled scutes 38 in lateral line. So far as I am able to judge they agree with the Jamaican examples.

**Trachurus symmetricus** (Ayres).

*Caranx symmetricus* Ayres, Proc. Cal. Acad. Nat. Sci., I, 1855, p. 62. Bay of San Francisco.

A single example from San Pedro, California.

*Seriola picturata* Bowdich[8] is represented by a miserable figure and does not appear certainly identifiable with the form on the Pacific coast of the United States. *Caranx cuvieri* Lowe[9] is also an Atlantic form.

**Trachurus mediterraneus** (Steindachner).

*Caranx trachurus* var. *mediterranea* Steindachner, Sitz. Ak. Wiss. Wien, LVII, 1868, p. 383. Das Mittelmeer. (Wiener Museum.)

*Caranx trachurus* Bonaparte, Cat. Met. Pesc. Europ., Napoli, 1846, p. 75. (Part.)

Head 3¾; depth 5; D. I, VIII–I, 32; A. II–I, 28; P. ii, 20; V. I, 5; scutes in lateral line 41+41 (82) to base of caudal; width of head 2⅓ in its length; depth of head 1$\frac{3}{7}$; mandible 2; fourth erect dorsal spine 2; snout 3 in head, measured from its own tip; maxillary 2$\frac{1}{2}$; orbit 3$\frac{1}{2}$; interorbital space 4$\frac{1}{4}$; ventral 2; least depth of caudal peduncle 7; depth of largest keeled scute in lateral line 5.

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[8] *Excursions in Madeira and Porto Santo*, 1825, p. 123, fig. 27.

[9] *Trans. Zool. Soc. Lond.*, II, 1837, p. 183.

Body elongate, slender, fusiform, greatest depth apparently near origin of soft dorsal, and profiles similar. Least depth of caudal peduncle nearly $\frac{1}{3}$ its length.

Head compressed, lower profile more full and steeper than upper. Snout long, compressed, and with a slight convex protrusion in front. Eye large, orbicular, with a well-developed adipose eyelid covering at least its posterior $\frac{2}{5}$, circular, high, and a little anterior in head. Mouth a little inclined, and mandible well protruded in front of upper jaw. Upper edge of maxillary entirely slipping under edge of preorbital, reaching about opposite front margin of eye, and its distal expanded extremity about equal to pupil. Small teeth uniserial in jaws. A small series of teeth across vomer and also a single series on each palatine. Tongue elongate, slender, free, rounded at tip and with a single asperous median patch posteriorly. Nostrils adjoining, and much nearer upper front rim of orbit than tip of snout. Interorbital space a little elevated and with a median keel from internasal space to occiput.

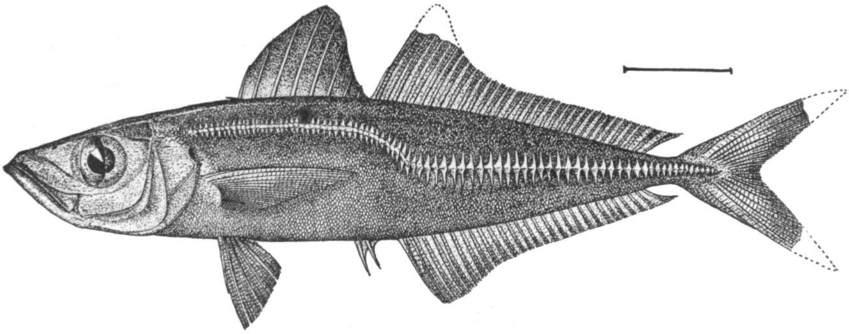

Fig. 4.—*Trachurus mediterraneus* (Steindachner).

Gill-opening extending forward not quite to nostril. Rakers 16 + 38? slender, equal to $\frac{2}{3}$ of orbit. Filaments only about $\frac{3}{5}$ length of longest rakers. Pseudobranchiæ a little smaller. Isthmus compressed, its lower surface with a median groove.

Scales small, extending well on head posteriorly, cheek, and opercle at least above. No scales now on anterior bases of rayed dorsal and anal. A large scaly flap behind axil of pectoral. Scutes in lateral line broadest along middle of keeled straight portion, those along side of caudal peduncle become more strongly keeled and dentate. Spinous dorsal and anal depressible in grooves.

Spinous dorsal inserted nearly midway between front margin of orbit and origin of soft anal in vertical. Third erect spine longest, others graduated down. Soft dorsal inserted about midway in length of trunk, and first rays longest. Spinous anal inserted a trifle before origin of soft dorsal, spines nearly equal. Soft anal similar to soft dorsal, only inserted more posteriorly. Caudal rather small, forked, and lobes apparently pointed. Pectoral rather long. Ventral inserted well behind pectoral and reaching a trifle over $\frac{2}{3}$ of space to origin of spinous anal.

Color in alcohol faded pale dull slaty-gray above, below pale brownish-white. Fins dull brown. Iris pale yellowish.

Length (end of caudal damaged) $7\frac{1}{2}$ inches.

No. 11,293, A. N. S. P. Beirut, Syria. One example.

It also agrees with twenty-one examples from Italy, of all ages. Bonaparte Coll. (No. 377). Dr. T. B. Wilson. One also from Malaga.

Dr. Steindachner first pointed out this form, basing it on Mediterranean examples with an increased number of scutes in the lateral line, 79–86. *T. trachurus* is said to have 70–75.

**Trachurops crumenophthalmus** (Bloch).

*Scomber crumenophthalmus* Bloch, Naturg. Ausl. Fisch., VII (X), 1793, p. 77, Pl. 343. An den afrikanischen Küsten, in der Gegend von Acara. (Dr. Isert.)

St. Thomas (West Indies), San Domingo (West Indies), New Providence (Bahamas), Santa Cruz (West Indies), and Newport (Rhode Island). Examples from the Pacific do not appear different. An example from Panama (Coll. J. A. McNeil) has: Head 3; depth $3\frac{2}{5}$; D. I, VIII–I, 26; A. II–I, 23; scales in lateral line 48, and remaining keeled scutes 33 (81); pectoral $1\frac{1}{6}$ in head; snout $3\frac{3}{4}$ in head, measured from tip of upper jaw; eye 3; maxillary $2\frac{1}{6}$; length $9\frac{3}{8}$ inches. Another example from Samoa differs in: Head $3\frac{1}{4}$; depth $3\frac{7}{8}$; A. II–I, 22; 54 scales in lateral line, and remaining keeled scutes 35 (89); eye $3\frac{1}{2}$ in head, measured from tip of upper jaw; snout $3\frac{1}{2}$; maxillary $2\frac{2}{7}$; length $7\frac{7}{8}$ inches. Smaller Hawaiian examples[10] differ in minor details.

I provisionally follow Dr. Günther in identifying all these examples with Bloch's *crumenophthalmus*, though possibly exhaustive material may prove different.

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[10] Recorded previously from Samoan and Hawaiian Islands (*Proc. Acad. Nat. Sci. Phila.*, 1900, p. 501).

### Subgenus ALEPES Swainson.

Scales small. No vomerine or palatine teeth.

**Alepes melanoptera** Swainson.

Lardner's Cab. Cyclop. Nat. Hist., II, 1839, p. 248. (Based on *Wori parah* Russell, Fishes of Coromandel, II, 1803, p. 40, Pl. 155. Vizagapatam.)

Head $3\frac{1}{4}$; depth $2\frac{1}{2}$; D. I, VIII–I, 24; A. II, I, 20; P. ii, 18; V. I, 5; scales 38 in lateral line, remaining portion composed of 55 scutes; about 15 scales between spinous dorsal and uppermost part of lateral line; width of head $2\frac{2}{5}$ in its length; depth of head $1\frac{1}{6}$; mandible $2\frac{1}{3}$; fourth dorsal spine 3; second dorsal ray 2; second anal ray $2\frac{1}{3}$; pectoral $1\frac{1}{9}$; least depth of caudal peduncle $5\frac{1}{2}$; snout $3\frac{1}{2}$ in head, from its tip; eye $3\frac{2}{3}$; interorbital space 3; maxillary $2\frac{2}{3}$.

Body moderately long, compressed, anterior profiles about evenly convex, and greatest depth at origin of soft dorsal. Caudal peduncle slender, compressed above and below, its least depth $1\frac{3}{4}$ in its length, and width a trifle less than its depth.

Head compressed, deep, and anterior profile obtuse. Snout convex, blunt, with upper jaw projecting. Eye small, anterior, and with a rather narrow adipose eyelid. Mouth small, oblique, upper jaw projecting beyond snout, and small maxillary reaching a little beyond front rim of orbit. Posterior distal expanded extremity of maxillary nearly equal to $\frac{1}{3}$ of orbit. Preorbital thin, and upper edge of maxillary slipping below all but a small portion posteriorly. Teeth minute, uniserial, and close together along edges of jaws. Vomer and palatines edentulous. Tongue with minute weak asperities, its own shape elongate, free and rounded in front. Lips thin. Nostrils close together, lateral, much nearer eye than tip of upper jaw, and anterior with a slightly elevated fleshy rim. Interorbital space broad, elevated, and giving place to median trenchant ridge which extends from above nostrils to occiput. Preopercular ridge and margin slightly inclined forward.

Gill-opening extending forward till below nostrils. Rakers 6+19, compressed, rather broad, and much shorter than filaments. Filaments about $\frac{2}{3}$ of orbit, and pseudobranchiæ much shorter. Isthmus narrow, not trenchant, and its lower surface very triangularly elongate.

Scales small, numerous, cycloid, and narrowly imbricated. Spinous dorsal with a narrow basal sheath. Soft dorsal and anal with anterior basal portion enclosed in rather broad basal scaly sheaths. Cheeks just below eye, and upper side of head posteriorly, also upper portion of opercle, with small scales. Base of caudal covered with small scales, but without any keels at bases of lobes. Lateral line strongly arched at first till opposite origin of soft dorsal, then straight to base of caudal. Shields small, deepest about 10 in greatest depth of body.

Spinous dorsal beginning well behind origin of pectoral, spines low, fourth highest, fin rounded above, and depressible in a groove. Origin of soft dorsal about midway between tip of mandible and base of caudal, first ray highest, and anterior higher rays graduated down from it, not forming a lobe. Last dorsal and anal rays hardly longer than those preceding. Soft anal similar to soft dorsal, its origin a little nearer base of caudal than front rim of orbit. Anal spines strong, short, depressible in a slight groove, and first inserted about opposite origin of soft dorsal. Belly in front of spinous anal with a short bony trenchant keel. Caudal small, forked, lobes pointed. Pectoral rather broad and pointed. Ventral small, reaching nearly half way to soft anal, and inserted a trifle in advance of origin of pectoral. Anus well anterior, near tips of ventrals.

Color when fresh in arrack with upper parts of body deep slaty-gray. Sides and lower surface whitish, and more or less silvery. Spinous dorsal black. Soft dorsal, caudal and anal dusky, other fins paler or whitish. Opercle with a large blue-black blotch above, nearly as large as eye. Iris yellowish. Peritoneum silvery.

Length 5 inches.

No. 27,501, A. N. S. P. Padang, Sumatra. One example.

*Caranx nigripinnis* Day[11] is identical. Russell's figure and description appear to represent this fish and not *Caranx prœustus* Bennett,[12] which Bleeker claimed to have discovered.

**Alepes amblyrhynchus** (Cuvier).

*Caranx amblyrhynchus* Cuvier, Hist. Nat. Poiss., IX, 1833, p. 76, Pl. 248. Brésil. (M. Delalande.)

Head $3\frac{3}{4}$; depth $2\frac{1}{3}$; D. I, VII–I, 28; A. II–I, 24; P. II, 19; V. I, 5; scales 41 in lateral line, remaining portion composed of about 50 scutes; about 16 scales between uppermost part of lateral line and spinous dorsal; width of head about 2 in its length; depth of head at posterior margin of eye about $1\frac{1}{10}$; mandible $2\frac{1}{4}$; fourth erect dorsal spine $3\frac{1}{3}$; first dorsal ray $1\frac{3}{4}$; first anal ray $1\frac{9}{10}$; least depth of caudal peduncle 5; snout $3\frac{7}{8}$ in head, measured from tip of upper jaw; eye $3\frac{2}{5}$; maxillary 3; interorbital space $2\frac{7}{8}$; pectoral $2\frac{1}{3}$ in head and trunk.

Other characters unless otherwise stated similar to *melanoptera*. Least depth of caudal peduncle about $2\frac{1}{2}$ in its length. Mandible only protruded a trifle. Distal expanded extremity of maxillary $\frac{1}{2}$ of pupil.

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[11] *Fishes of India*, II, 1876, p. 225, Pl. 51, fig. 5. Madras and Andamans.

[12] *In Mem. Life and Serv. Raffles*, 1830, p. 689. Sumatra.

Gill-opening extending forward opposite front margin of orbit. Rakers 9+21. Filaments about half of orbit. Pseudobranchiæ shorter than filaments. Entire bases of rayed dorsal and anal scaly. Straight portion of lateral line beginning a little behind origin of soft dorsal. Soft dorsal inserted much nearer tip of mandible than base of caudal, and soft anal similarly inserted. No trenchant bony keel in front of spinous anal. Caudal rather large. Anus just before tip of ventrals. In alcohol spinous dorsal brown above. Anal whitish like ventrals. An indistinct diffuse grayish-dusky blotch on opercle above. Iris dull brassy.

One example from Rio Janeiro, Brazil, 8 inches long.

### Subgenus SELAR Bleeker.

Nat. Tijds. Ned. Ind., I, 1850 (1851), pp. 343, 352 (*boöps*).

**Caranx megalaspis** (Bleeker).

*Selar megalaspis* Bleeker, l. c., V, 1853, p. 502. Priaman, in mari. (M. Godin.)

*Caranx megalaspis* Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 510, Pl. 13, upper figure.

Head $3\frac{7}{8}$; depth $2\frac{2}{3}$; D. VIII–I, 25; A. II–I, 20; P. II, 19; V. I, 5; scales in lateral line about 30, its remaining portion composed of about 40 large scutes; about 10 scales between origin of dorsal and upper part of lateral line, and nearly 30 between latter and origin of anal in an oblique series; width of head $2\frac{1}{8}$ in its length; depth of head $1\frac{1}{10}$; mandible $2\frac{1}{19}$; third dorsal spine $2\frac{1}{2}$; second dorsal ray $1\frac{3}{4}$; first anal ray $2\frac{2}{5}$; least depth of caudal peduncle 5; snout $3\frac{2}{3}$ from its tip; eye $3\frac{1}{3}$; maxillary $2\frac{2}{5}$; interorbital space 4; upper lobe of caudal $3\frac{1}{2}$ in head and trunk; pectoral $3\frac{1}{2}$.

Body greatly compressed, ovoid, and anteriorly upper and lower profiles evenly convex. Greatest depth at origin of soft dorsal. Caudal peduncle small, its depth $2\frac{1}{3}$ its length, and its width about $\frac{2}{3}$ its depth.

Head rhomboid, compressed, and blunt anteriorly. Snout short, blunt, and compressed. Eye large, anterior, and with a broad posterior adipose eyelid. Mouth oblique and upper jaw projecting slightly beyond snout. Lips fleshy and lower rather broad. Teeth minute, uniserial, in jaws. Small teeth in patches on vomer and palatines. Tongue free, rounded in front, and rather long. Mandible projecting beyond upper jaw. Maxillary reaching posteriorly a little beyond front rim of orbit, and its distal expanded extremity half of orbit. Also with a distinct oblique ridge. Nostrils lateral, close together, and a little nearer eye than tip of snout. Interorbital space convexly elevated, with a median trenchant keel which begins anteriorly and runs to spinous dorsal. Margin of preopercle convex.

Gill-opening carried forward till opposite front margin of orbit. Rakers 7+25, a little longer than longest filaments, or a trifle over half of eye, compressed, rather thin, and pointed. Pseudobranchiæ small. Isthmus narrow, but not trenchant.

Scales small, cycloid, discoid and imbricated. Head naked, except a patch of scales on cheek adjoining eye, opercle, and upper posterior side. Anterior portions of soft dorsal and anal with scaly sheaths. Spinous dorsal with a low basal sheath. Bases of caudal and pectoral scaled. Straight portion of lateral line beginning below origin of soft dorsal, curved portion about 2¾ in straight portion, and broadest scutes about 4⅙ or less in depth of body.

Spinous dorsal small, spines slender, depressible in groove, third longest, and origin of fin well behind that of pectoral, or much nearer origin of soft dorsal than posterior rim of orbit. Soft dorsal inserted much nearer tip of snout than base of caudal, and anterior rays elevated, first developed ray longest. Soft anal similar, but its insertion posterior and nearly median in body. Anal spines inserted in advance of soft dorsal, depressible in a groove, and second longer. Caudal deeply forked, lobes long and pointed, and upper much longer. Pectoral a little longer than head, falcate, and reaching opposite base of fourth ray. Ventral small, pointed, inserted below origin of pectoral, and length about equal to eye.

Color when fresh in arrack with bright silvery prevailing, back and upper surface of head pale slaty-gray. A large blackish blotch nearly equal to eye on upper part of opercle and shoulder-girdle. This is also reflected inside gill-opening. Snout dusky above. Fins pale brownish, upper portions of dorsals and caudal dusky. Iris yellowish. Peritoneum pale and whitish.

Length 5⅛ inches.

No. 27,504, A. N. S. P. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. In all 8 examples in Acad. Nat. Sci. Phila. and Stanford University.

This species is related to *Caranx kalla* Cuvier,[13] from which it is distinguished, however, by the broad armature of the lateral line. Upon comparison with Swatow examples[14] of *kalla* the scutes were found constantly much narrower than in *megalaspis*. In the latter they are always equal to a little over orbit. *Scomber kleinii*[15] is also related, but differs in having shorter scutes. The figure shows them a little over 5 in greatest depth of body. Bloch remarks "les opercules sont unis; et l'on discerne une tache blue sur le postérieur," though it is not indicated on his figure. Cuvier considered *Caranx peronii*[16] very close, if not identical. *C. megalaspis* is also related to *C. boops* Cuvier, but the scutes of that species range from 45 to 50, while in the former they are seldom over 40.[17] No trace of a yellow longitudinal band observed.

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[13] Cuvier, *Hist. Nat. Poiss.*, IX, 1833, p. 37. Pondichéry. Malabar. La mer Rouge. (M. Geoffroy.) Mahé. (M. Bélenger et M. Dussumier.)

[14] Rutter, *Proc. Acad. Nat. Sci. Phila.*, 1897 (1898), p. 72.

[15] Bloch, *Naturg. Ausl. Fisch.*, VII (X), 1793, p. 86, Pl. 347, fig. 2. Der malabarischen Küste.

**Caranx mate** Cuvier.

> Hist. Nat. Poiss., IX, 1833, p. 40. Pondichéry. Des Séchelles. (M. Dussumier.) Nouvelle-Guinée. (MM. Quoy and Gaimard.) D'étroit d'Antjer. (M. Raynaud.)——Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 510, Pl. 13, lower figure.

Head $3\frac{1}{2}$; depth $3\frac{2}{7}$; D. VIII–I, 23; A. II–I, 19; P. II, 19; V. I, 5; scales 50 in lateral line, remaining scutes about 42; 10 scales between origin of spinous dorsal and lateral line in a vertical series ; about 30? scales between latter and anus (squamation injured); width of head $1\frac{9}{10}$ in its length; depth of head $1\frac{1}{4}$; mandible $2\frac{1}{4}$; third dorsal spine $2\frac{1}{10}$; first dorsal ray $2\frac{1}{8}$; first anal ray $2\frac{1}{3}$; least depth of caudal peduncle $7\frac{1}{3}$; snout $3\frac{1}{6}$, in head, measured from its tip; eye 4; maxillary $2\frac{3}{4}$; interorbital space $3\frac{1}{6}$; pectoral 3 in head and trunk.

Body compressed, deep, anterior profiles evenly convex, and lower becoming more so posteriorly so that greatest depth is at spinous anal. Caudal peduncle slender, broadly depressed, so that its least depth is 3 and its least width 2 in its length.

Head compressed, deep, and pointed in front. Snout conic, pointed, but with upper jaw projecting. Eye small, anterior, and with broad adipose cyelids, only a vertical slit equal in width to half its diameter exposed. Mouth inclined and slightly curved, and mandible projecting beyond upper jaw. Lips fleshy, and on each ramus of mandible broad and thick. Maxillary reaching a little beyond front rim of eye, its upper edge entirely slipping below broad preorbital, and its distal expanded extremity half of orbit. A short oblique groove continued down from lower angle of maxillary when mouth is closed. Teeth in jaws small, sharp pointed, and uniserial. Vomer and palatines with patches of minute teeth. Tongue elongate, free, and rounded in front, its upper surface with minute asperities. Nostrils small, high on snout, but nearer eye than tip of former. Interorbital space elevated, giving place to median keel which begins over nostrils and extends to occiput.

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[16] *Hist. Nat. Poiss.*, IX, 1833, p. 84. Vanicolo. (MM. Quoy and Gaimard.) Amboine. Java. Malabar.

[17] *L. c.*, p. 35. Amboine. (MM. Quoy and Gaimard.) Vanicolo.

Preorbital and preopercle with small flutings, edge of latter strongly convex.

Gill-opening carried forward below nostrils. Rakers 11+27, compressed, slender, and longest about $\frac{4}{5}$ length of longest filaments which are about $\frac{2}{3}$ of orbit. Pseudobranchiæ about half of eye. Isthmus narrow, not trenchant.

Scales small, narrowly imbricated, and cycloid. Head naked, except cheek and upper posterior side above opercles. Spinous dorsal with a low basal scaly sheath, but those of soft dorsal and anal well developed. Base of caudal scaled, and that of pectoral naked. Straight portion of lateral line beginning after elevated dorsal rays or at tip of depressed pectoral. Scutes small, deepest $6\frac{1}{2}$ in greatest depth of body.

Spinous dorsal small, spines slender, pungent, depressible in a groove, and third and fourth nearly equal. Origin of fin over first fifth of length of pectoral, or nearly equal in space between tip of latter and front rim of orbit. Soft dorsal beginning about over last third of pectoral, or nearly midway between tip of mandible and base of caudal. First few anterior rays elevated, and graduated down from first and second developed rays which are longest. Last dorsal and anal ray finlet-like and longer than preceding. Anal similar to soft dorsal, its origin a little before tip of pectoral, or a little nearer base of caudal than front rim of eye. Anal spines short, depressible in a groove, posterior longer, and origin of fin almost opposite that of soft dorsal. Caudal forked, lobes small and pointed, and no keels at their bases. Pectoral long, falcate, and its origin nearly level with lower rim of orbit. Ventral small, depressible in a groove, and about equal to postocular region. Anus nearly midway between root of ventral and origin of anal, or at tips of ventrals.

Color when fresh in arrack grayish-silvery, somewhat slaty above, and sides, together with lower surface, white. A large deep blue-black blotch on opercle, and upper portion of shoulder-girdle same color. Dorsals, caudal and pectoral grayish tinged with dull yellow, and other fins whitish. Iris yellowish. Peritoneum gray.

Length $7\frac{5}{8}$ inches.

No. 27,508, A. N. S. P. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. Seven examples. Acad. Nat. Sci. Phila. and Stanford University.

Dr. Günther claims[18] *Selar hasseltii* Bleeker[19] is furnished with a narrow band of teeth in the upper jaw. In Bleeker's account the maxillary teeth are said to be small, equal and conspicuous. This also agrees with my examples, though the transverse diffuse vertical bands were not observed when they were first received. Dr. Steindachner has united this form[20] with *Caranx affinis* Rüppell,[21] basing it on Hawaiian material, though Rüppell's fish never seems to have been satisfactorily compared. *Caranx xanthurus*[22] appears to be identical but is of later pagination.

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[18] *Cat. Fish. Brit. Mus.*, II, 1860, p. 430. Amboyna. (Mr. Frank.)

[19] Bleeker, *Nat. Tijds. Ned. Ind.*, I, 1850 (1851), p. 359. Batavia, Cheribon, Surabaja, in mari.

### ELAPHROTOXON subgen. nov.

Type *Scomber ruber* Bloch.

Subgenus *Caranx* Jordan and Evermann[23] is identical. Their subgenus *Tricropterus* becomes identical with subgenus *Caranx* as here understood.

(*'Ελαφρὸς*, shallow; *τόξον*, bow; with reference to the slightly convex anterior portion of lateral line.)

**Caranx ruber** (Bloch).

*Scomber ruber* Bloch, Naturg. Ausl. Fisch., VII (X), 1793, p. 75, Pl. 342. Bey der Insel St. Croix. (Dr. Isert.)

One from New Providence (Bahamas), Coll. Dr. H. C. Wood.

### Subgenus CARANX Lacépède.

**Caranx hippos** (Linnæus).

*Scomber hippos* Linnæus, Syst. Nat., Ed. XII, Reformata, 1766, p. 494. Carolina. (D. Garden.)

Newport (Rhode Island), Beasley's Point (New Jersey), San Domingo (West Indies), Pernambuco (Brazil).

### VEXILLICARANX subgen. nov.

Type *Caranx africanus* Steindachner.

Inner teeth in each jaw minute, pointed, equal, and forming a narrow band, at least in front. Outer teeth a little enlarged and forming a single series at least, in each jaw. Breast naked. No opercular spot. Anterior rays of soft dorsal and anal produced into long slender falcate lobes. Pectoral long, falcate. Anterior curved portion of lateral line a little less than half of remaining straight portion. Adipose eyelid rather narrow.

(*Vexillum*, streamer; *Caranx*, from *Carangue*, French vernacular.)

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[20] *Sitz. Ak. Wiss. Wien*, LXXXIII, 1881, p. 211.

[21] *Neue Wirbelthiere*, Fisch., 1835, p. 49, Pl. 14, fig. 1. Massaua.

[22] Kuhl and Van Hasselt, in Cuvier, *Hist. Nat. Poiss.*, IX, 1833, p. 41. Java. (MM. Kuhl and Van Hasselt.)

[23] *Bull. U. S. Nat. Mus.* (Fish. N. Mid. Am.), No. 47, I, 1896, p. 916.

**Caranx africanus** Steindachner.

Sitz. Ak. Wiss. Wien, LXXXVIII, 1883 (1884), p. 1108, Pl. 7, fig. 1. Gorée. (Herr W. Höfler.) Küste Liberia's. (Herr Büttikofer.) Lagos und der Loango-Küste. [All Coll. Vienna Mus.]

Head $3\frac{2}{3}$; depth $2\frac{4}{7}$; D. I, VIII–I, 21; A. II–I, 18; keeled scutes 44 in straight portion of lateral line; fourth erect dorsal spine $2\frac{1}{2}$ in head; first developed anal ray $1\frac{1}{3}$; ventral (damaged) about $2\frac{1}{5}$; mandible 2; snout $3\frac{2}{7}$ in head, from tip of upper jaw; eye $3\frac{2}{3}$; maxillary $2\frac{2}{5}$; interorbital space $3\frac{1}{3}$; least depth of caudal peduncle 5. Maxillary reaching about opposite first $\frac{2}{5}$ of orbit, and its expanded extremity 2 in latter. Rakers 13+28, slender, compressed, much longer than filaments or about $\frac{2}{3}$ of orbit. Anus a little before tips of ventrals. Deepest scute about $8\frac{1}{2}$ in greatest depth of body. Long falcate dorsal lobe reaching when depressed at least opposite base of last dorsal ray. Pectoral $2\frac{1}{3}$ in head and trunk. Length $9\frac{3}{4}$ inches. West Africa. Dr. H. E. Savage.

### Subgenus PARATRACTUS Gill.

**Caranx crysos** (Mitchill).

*Scomber crysos* Mitchill, Trans. Lit. Philos. Soc. New York, I, 1815, p. 424, Pl. 4, fig. 2. Bay of New York.

Nantucket (Massachusetts) and Newport (Rhode Island).

**Caranx pisquetus** Cuvier.

Hist. Nat. Poiss., IX, 1833. p. 73. Saint-Domingue. Cuba. Brésil.

Head $3\frac{3}{7}$; depth $3\frac{1}{8}$; D. VIII–I, 23; A. II–I, 20; P. II, 20; V. I, 5; scales about 46 in lateral line, and remaining keeled scutes about 45; about 16 scales between spinous dorsal and lateral line in a vertical series, and about 24 between latter and origin of rayed anal similarly; width of head $1\frac{9}{10}$ in its length; depth of head $1\frac{2}{7}$; mandible 2; third dorsal spine $2\frac{3}{7}$; first dorsal ray $1\frac{1}{12}$; first anal ray $2\frac{1}{6}$; length of ventral $2\frac{1}{2}$; snout $3\frac{1}{3}$ in head, measured from tip of upper jaw; eye $5\frac{1}{4}$; maxillary $2\frac{2}{5}$; interorbital space 3; least depth of caudal peduncle $7\frac{2}{3}$; pectoral $2\frac{4}{5}$ in head and trunk; upper caudal lobe $3\frac{3}{5}$.

Body elongate fusiform, compressed, and greatest depth at origin of anal. Lower profile a little more convex than upper. Caudal peduncle slender, its least depth about $3\frac{1}{3}$ in its length.

Head moderately large, robust, compressed, and upper profile evenly and a little more convex than lower. Snout a little long, convex, and upper jaw well protruding in front. Eye orbicular, its lower rim about level with middle of greatest depth, and its posterior rim a little posterior in length of head. Mouth little inclined, and mandible produced a little beyond tip of upper jaw. Lips rather thick and fleshy. Maxillary reaching at least opposite middle of orbit, its distal expanded extremity equal to about $\frac{5}{6}$ of orbit, and its entire upper edge slipping below preorbital edge. Teeth of upper jaw biserial, those forming outer series enlarged conic and forming a single series, and those inside forming a band of small pointed teeth broadest and mostly developed anteriorly. Mandibular teeth like outer series in upper jaw, and also uniserial. A finely asperous small triangle on vomer. Surfaces of palatines and tongue with broad spaces finely asperous. Tongue rather elongate, thick, rounded, and free in front. Nostrils adjoining, small slits, above middle of orbit in its vertical diameter, and also nearer front of same than tip of snout. Supraocular ridge a little pronounced. Top of head strongly convex and a somewhat obsolete median keel from internasal space to occiput.

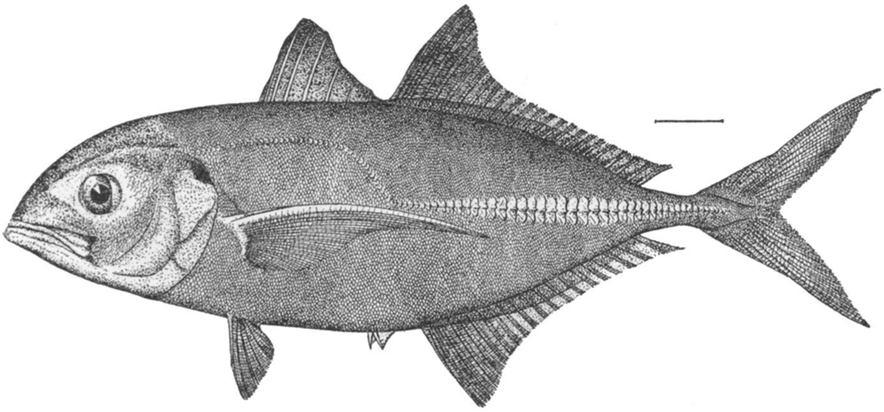

Fig. 5.—*Caranx pisquetus* Cuvier.

Gill-opening carried forward about midway between front of eye and posterior nostril. Rakers I, 15+25, I, slender, compressed, and longest equal to longest filament or about $\frac{2}{3}$ of orbit. Pseudobranchiæ about equal to diameter of pupil. Isthmus with a rather broad groove on lower surface.

Scales small, cycloid, extending over chest entirely and good portion of all rayed fins basally. On occipital region small, larger on postocular region, and again smaller on cheek. With exception of these regions together with upper side of head and opercle, head is naked. Adipose eyelid narrow, not covering much of iris posteriorly. No scales on spinous dorsal and anal, these fins each depressible in a groove along each side of which a sheath of fine scales is formed. Anterior rays forming lobes of soft dorsal and anal covered with minute crowded scales. Bases of anterior and elongated dorsal and anal rays also with scaly sheaths into which fins are more or less depressible, and on posterior rays scales gradually disappear. Base of caudal covered with small scales, and a cutaneous keel at base of each lobe laterally. Arch of lateral line about $1\frac{2}{3}$ in straight portion. Greatest depth of keels or scutes about 8 in greatest depth of body. Tubes in lateral line simple. An axillary pit at base of ventral.

Spinous dorsal inserted opposite first $\frac{2}{5}$ of depressed ventral, third spine highest, and others graduated down. Soft dorsal lobe higher than spinous fin, first ray highest, and origin of fin nearer front rim of orbit than base of caudal. Last dorsal and anal rays longer than those preceding. Soft anal similar to soft dorsal, though inserted nearly midway between base of caudal and posterior rim of orbit. Anal spine small, short, second longest, and first inserted nearly opposite origin of soft dorsal. Caudal large, forked, lobes slender, sharply pointed, and about equal. Pectoral long, falcate, upper ray much longest, and reaching well beyond beginning of straight portion of lateral line or dorsal and anal lobes. Ventral inserted a trifle behind origin of pectoral, and reaching over half way to origin of spinous anal. Spine small, slender, weak, and over half length of first or longest ray. Anus a little nearer tips of ventrals than origin of spinous anal.

Color in alcohol dull olivaceous-brown above, lower surface whitish or pale. Evident silvery reflections over most of lower regions. Fins brownish, lower ones paler, and dorsals and caudal a trifle more brownish. Iris dull brassy. Peritoneum pale silvery.

Length $13\frac{3}{4}$ inches.

No. 11,240, A. N. S. P. San Domingo, West Indies. Prof. W. M. Gabb. One example.

This species appears to differ from *Caranx crysos* chiefly in its more elongate fusiform body, higher dorsal and anal rayed lobes, and especially the longer pectoral. I have not had the opportunity of comparing small examples of *C. pisquetus*.

### Subgenus CARANGICHTHYS Bleeker.

Nat. Tijds. Ned. Ind., III, 1852, p. 760 (*typus*).

**Caranx sem** Cuvier.

Hist. Nat. Poiss., IX, 1833, p. 79. Pondichéry. (M. Leschenault.)——Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 512, Pl. 14, upper figure.

Head $3\frac{2}{5}$; depth $2\frac{4}{7}$; D. VIII–I, 20; A. II–I, 16; P. ii, 18; V. I, 5; scales 57 in curved portion of lateral line, and about 37 scutes in remaining straight portion; about 24 scales between origin of spinous dorsal and upper curved portion of lateral line; width of head $2\frac{1}{10}$ in its length; depth of head 1; mandible 2; third dorsal spine $2\frac{1}{2}$; second dorsal ray $1\frac{7}{8}$; second anal ray 2; least depth of caudal peduncle 7; ventral $2\frac{1}{3}$; snout $3\frac{1}{2}$ from tip of upper jaw; eye $3\frac{2}{3}$; maxillary $2\frac{1}{4}$; interorbital space $3\frac{9}{10}$; pectoral 3 in body; upper caudal lobe $3\frac{1}{3}$.

Body oblong, compressed, upper profile a little more convex than lower, and greatest depth at origin of soft dorsal. Caudal peduncle rather long, its least depth $2\frac{1}{2}$, and in its width $2\frac{1}{8}$ in its length.

Head deep, compressed and upper profile obliquely convex. Snout oblique, blunt, and with upper jaw projecting. Eye small, anterior, and with a rather narrow posterior adipose eyelid. Mouth oblique, gape reaching below nostrils, and mandible projecting beyond upper jaw. Maxillary reaching opposite anterior margin of pupil, with its distal expanded extremity free from preorbital above and about equal in width to $\frac{2}{3}$ of eye. Lips thick and fleshy. An outer series of enlarged teeth in upper jaw becoming a little larger anteriorly, and a double or irregular series of small inner teeth. Teeth in mandibles subequal, rather large, and with 6 or more forming a small outer series in front. Vomer, palatines and tongue with patches of minute teeth. Tongue elongate, rounded and free in front. Nostrils small slits close together, lateral, high, and near front rim of orbit. Interorbital space rather narrow, elevated, and with a median trenchant ridge originating above nostrils and continued to occiput. A low supraocular ridge. Preorbital broad, fluted above, and about equal to $\frac{2}{3}$ of orbit. Margin and ridge of preopercle oblique.

Gill-opening deep, extending forward opposite nostrils. Rakers 7+16, slender, compressed, a little shorter than filaments or about half of orbit. Pseudobranchiæ rather small. Isthmus rather narrow, with a slight groove.

Scales small, cycloid, and narrowly imbricated. Head, with exception of cheek, upper side and opercle, naked. Base of spinous dorsal with a low scaly sheath, and anterior basal portions of soft dorsal and anal with scaly sheaths. Base of caudal covered with small scales and base of each lobe with a low obsolete ridge. Base of pectoral naked. Anterior rays of soft dorsal and anal with small scales. Lateral line straight after fifth dorsal ray, and deepest shields about $8\frac{1}{2}$ in greatest depth of body.

Origin of spinous dorsal well behind that of pectoral, spines rather rigid, third longest, and all depressible in a groove. Soft dorsal inserted midway between front of orbit and base of caudal, anterior rays elevated in a lobe, and last ray a little longer than those immediately preceding. Soft anal similar, inserted a little nearer posterior rim of orbit than base of caudal, and its base like that of soft dorsal, a little convex. Anal spines small, first inserted opposite origin of soft dorsal, second longer, and both depressible in a groove. A short keel on abdomen in front reaching to anus. Caudal small, triangular, forked, and lobes pointed. Pectoral long, falcate, and reaching beyond beginning of straight part of lateral line. Ventral small, inserted a little in advance of origin of pectorals, and not reaching half way to origin of soft anal. Anus near tips of ventrals.

Color when fresh in arrack with upper part of body slaty-gray, shot with pale metallic blue and purple, lower surface white and washed everywhere with bright silvery. Upper part of spinous dorsal and upper part of anterior dorsal lobe dusky, latter deeper. Caudal more or less dusky on upper lobe. Base of pectoral dusky inside. Fins with these exceptions pale yellowish. No opercular spot. Peritoneum silvery.

Length $5\frac{5}{8}$ inches.

No. 27,514, A. N. S. P. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. Two examples. Acad. Nat. Sci. Phila. and Stanford University.

Close to *Caranx latus* Agassiz,[24] but differing in the more convex profile, upper lobe of soft dorsal dusky, and tip of upper caudal lobe same color. *Scomber heberi*[25] may prove identical.

**Caranx marginatus** (Gill).

*Carangus marginatus* Gill, Proc. Acad. Nat. Sci. Phila., 1863 (1864), p. 166 Western Coast of Central America. (Capt. John M. Dow.)

*Caranx latus* Fowler, Proc. Acad. Nat. Sci. Phila., 1900 (1901), p. 501. (Not of Agassiz.)

Head $3\frac{1}{5}$; depth $2\frac{3}{4}$; D. VIII–I, 20; A. II–I, 16; scutes in straight part of lateral line 28; width of head $2\frac{1}{5}$ in its length; third dorsal spine $2\frac{1}{2}$; first dorsal ray about $1\frac{3}{5}$; first anal ray about 2; ventral $2\frac{1}{6}$; snout $3\frac{2}{5}$ in head, measured from its tip; eye 4; maxillary 2; interorbital space $3\frac{1}{6}$; pectoral 3 in head and trunk. Depth of deepest scute in lateral line about 7 in greatest depth of body. Maxillary reaching about opposite posterior margin of pupil. Gill-rakers 7 + 14, compressed, and longest a little longer than filaments or about $\frac{4}{7}$ of orbit. Adipose eyelid well developed, nearly covering posterior third of head. A very pale opercular spot at upper corner of gill-opening. Fins all pale except upper portions of anterior dorsal rays which are dusted with brownish. Length $7\frac{1}{4}$ inches. Two examples from Honolulu, Hawaiian Islands, collected by Dr. Benjamin Sharp. These were wrongly called *Caranx latus* by me, and are evidently identical with the examples identified as *C. marginatus* by Dr. Jenkins.[26]

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[24] *Sel. Gen. Spec. Pisc. Brasil.*, 1829, p. 105, Pl. 56*b*, fig. 1. Oceano Atlantico. (Museo Monacensi.)

[25] Bennett, *Fishes of Ceylon*, Ed. II, 1834, p. 26, Pl. 26. Ceylon.

**Caranx latus** Agassiz.

Sel. Gen. Spec. Pisc. Brasil., 1829, p. 105, Pl. 56*b*, fig. 1. In Oceano Atlantico· [Brazil.] (Museo Monacensi.)

*Caranx hippus* Cope, Trans. Amer. Philos. Soc., XIV, 1871, p. 472. (Not of Linnæus.)

Head $3\frac{1}{12}$; depth $2\frac{3}{5}$; D. I, VIII–I, 21; A. II–I, 16; scutes 34 in straight part of lateral line; width of head 2 in its length; mandible $1\frac{1}{12}$; fourth dorsal spine $2\frac{9}{10}$ (third longest but damaged); ventral $2\frac{1}{3}$; snout $3\frac{2}{3}$ in head, measured from its own tip; eye $3\frac{2}{3}$; maxillary $2\frac{1}{20}$; interorbital space $3\frac{1}{3}$; least depth of caudal peduncle $6\frac{3}{4}$; pectoral $2\frac{4}{5}$ in head and trunk. Maxillary not quite reaching posterior margin of orbit. Adipose eyelid covering posterior half of iris only. Gill-rakers 6 + 16, compressed, longest much longer than filaments or about $\frac{3}{5}$ of orbit. A pale brownish spot at upper corner of gill-opening. No opercular spot. Length $8\frac{1}{8}$ inches. Rio Janeiro, Brazil. Drs. Ruschenberger and Turner. Other examples also from San Domingo (West Indies) and Surinam.

Young examples from Culebra, Porto Rico, received from the U. S. Fish Commission, show spinous dorsal blackish. Side of trunk with five pale plumbeous-gray transverse bands extending down below lateral line and fading out on abdomen. First a little narrow and beginning from origin of spinous dorsal. Second extending from posterior base of spinous dorsal and crossing curved part of lateral line. Third much broader and crossing straight part of lateral line anteriorly. Fourth extending from middle of base of rayed dorsal, and fifth from bases of posterior rays. Some examples show a rather indistinct or diffuse grayish-brown streak sloping down anteriorly through eye to end of maxillary.

### CARANGOIDES Bleeker.

Nat. Tijds. Ned. Ind., I, 1850 (1851), pp. 343, 352 (*præustus*).

Originally *Scyris, Alectis* and *Citula* were included. No type is indicated, though the first species mentioned, *præustus*, was probably intended. *Carangoides plagiotænia* cannot be used as it was not discovered till later.[27]

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[26] *Bull. U. S. Fish Comm.*, XXII, 1902 (1904), p. 444.

[27] *Act. Soc. Sci. Ind. Neerl.* (Acht. Bijd. Visch. Amboina), II, 1857, p. 59.

**Carangoides malabaricus** (Schneider).

*Scomber malabaricus* Schneider, Syst. Ichth. Bloch, 1801, p. 31. Habitat cum antecedente [which is "ad Tranquebariam"].

Head $3\frac{1}{10}$; depth 2; D. VIII–I, 22; A. II–I, 18; scales 65 in lateral line, and scutes about 30; pectoral 1 in head; ventral about 4; snout $3\frac{1}{8}$ from tip of upper jaw; eye $2\frac{4}{5}$; maxillary $2\frac{1}{4}$; interorbital space $3\frac{1}{2}$. Gill-rakers 11+22, and a little longer than filaments. Scutes small and weak. Color when fresh in arrack slaty-brown above, top of head grayish or leaden, greater portion of sides and all of lower surface whitish washed everywhere with silvery. Upper edge of opercle with a small blackish spot. Axil of pectoral brownish. Fins plain or dilute brownish. Length $4\frac{1}{16}$ inches. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. Two examples. Acad. Nat. Sci. Phila. and Stanford University.

**Carangoides oblongus** (Cuvier).

*Caranx oblongus* Cuvier, Hist. Nat. Poiss., IX, 1833, p. 96. Vanicolo. (MM. Quoy and Gaimard.) Oualan. (M. de Mertens.)

Head $3\frac{1}{2}$; depth $2\frac{1}{2}$; D. VIII–I, 21; A. II–I, 18; scales 59 in lateral line, and scutes 39; snout 3 in head; eye $3\frac{4}{5}$; maxillary $2\frac{4}{7}$; interorbital space $4\frac{1}{5}$; ventral about 2; pectoral $2\frac{3}{7}$ in body, without caudal. Gill-rakers 7+16, ii, long, compressed, and about equal to filaments of half of eye. Color when fresh in arrack leaden-gray above, silvery-white below, and everywhere more or less silvery. On back between bases of each fin ray a bluish-gray blotch. Basal portion of anterior soft dorsal and anal rays tinged with pale yellowish. Length 11 inches. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. Two examples. Acad. Nat. Sci. Phila. and Stanford University.

### CITULA Cuvier.

Règne Animal, Ed. I, II, 1817, p. 315 (*armata*).——Cuvier, l.c., Ed. II, II, 1829, p. 209

#### Subgenus CITULA Cuvier.

Ventrals short and pale. Straight portion of lateral line beginning well beyond origin of soft dorsal.

**Citula armata** (Forskål).

*Sciæna armata* Forskål, Descript. Animal., 1775, p. 53. [Red Sea.]
*Citula atropos* Fowler, Journ. Acad. Nat. Sci. Phila., XII (2), 1904, p. 513, Pl. 14, lower figure to left. (Not of Schneider.)

Head $3\frac{1}{10}$; depth 2; D. VIII–I, 22; A. II–I, 18; P. ii, 19; V. I, 5; scales 95 in curved portion of lateral line, and about 32 in remaining short straight portion; about 25 scales between soft dorsal and upper curved portion of lateral line; width of head $2\frac{2}{5}$ in its length; depth of head greater than length; mandible $2\frac{1}{8}$; third dorsal spine $2\frac{3}{4}$; first dorsal ray $1\frac{1}{4}$; first anal ray $1\frac{1}{4}$; upper caudal lobe 1; least depth of caudal peduncle $6\frac{1}{2}$; ventral $2\frac{1}{2}$; snout $2\frac{4}{5}$ from tip of upper jaw; eye $3\frac{4}{7}$; maxillary $2\frac{2}{3}$; interorbital space $3\frac{1}{3}$; pectoral $2\frac{3}{5}$ in head and trunk.

Body rather oblong, deep, compressed, and greatest depth at origin of soft dorsal. Caudal peduncle small, its depth $2\frac{1}{8}$, and its width 2 in its length.

Head deep, compressed, and upper profile oblique, slightly convex at first and then more so at occiput. Lower profile less convex than upper. Snout broad, oblique, compressed, slightly prominent, and with upper jaw a little protruded. Eye large, a trifle anterior, and without adipose eyelid. Mouth oblique, small, curved, and gape reaching about $\frac{3}{4}$ in vertical to anterior nostril. Mandible projecting well beyond upper jaw. Maxillary free distally, its expanded portion 2 in eye, and reaching below posterior nostril, but not to orbit. Lips rather broad and thick. Teeth minute and in bands in jaws. Patches of minute asperities on vomer, palatines and tongue. Tongue broad, rather long, obtusely rounded and free in front. Nostrils close together, high lateral, and much nearer upper rim of orbit than tip of snout. Interorbital space broad, well elevated, and giving place to a high median trenchant keel extending to spinous dorsal. Preorbital broad, with several radiating flutings above, and its width about $\frac{4}{5}$ of orbit.

Gill-opening deep, extending forward opposite nostrils. Rakers 7+16, II, long, slender, compressed, asperous on inner surfaces, and longest half of eye. Filaments $\frac{5}{6}$ of longest raker, and pseudobranchiæ a little shorter. Isthmus compressed, edge not sharp.

Scales minute, narrowly imbricated, and crowded on back in front. Chest and base of pectoral naked. Cheeks and upper posterior side of head scaly, otherwise naked. A low scaly sheath along base of spinous dorsal. Soft dorsal and anal, except last few rays with rather high or broad basal scaly sheaths. Caudal with small scales on its base, and a low ridge at base of each lobe. Ventral with a deep basal fissure and a row of scales running back from its upper basal portion. Lateral line concurrent with back till opposite middle of base of soft dorsal and then straight to base of caudal. Scutes small, weak, deepest about $\frac{1}{3}$ least depth of caudal peduncle.

Origin of spinous dorsal but little behind that of pectoral, third ray longest. and all depressible in a low groove. Soft dorsal with first ray elongate, and those anteriorly also elevated, though much shorter. Last dorsal and anal rays much longer than those immediately preceding. Origin of soft dorsal nearly midway between front rim of orbit and base of caudal. Soft anal similar to soft dorsal, but its origin a short distance posterior. Anal spines short, small, second largest, and first inserted about opposite origin of soft dorsal. Short bony keel extending forward to tips of ventrals from origin of spinous anal. Caudal triangular, rather large and lobes pointed. Pectoral long, falcate, and nearly reaching beginning of straight portion of lateral line. Ventral inserted below origin of pectoral and reaching a little over half way to origin of soft anal. Anus midway between bases of ventrals and origin of spinous anal.

Color when fresh in arrack leaden or grayish-brown above, shot with bluish and purple, and silvery-white extending over lower surface. Basal portions of anterior rays of soft dorsal and anal tinged with pale yellowish. Spinous dorsal and upper portions of soft dorsal dusky. Upper front edge of caudal lobe dusky. Fins otherwise dilute yellowish. A small brown opercular spot. Peritoneum pale. Iris pale yellowish.

Length 11 inches.

No. 27,519, A. N. S. P. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. Four examples. Acad. Nat. Sci. Phila. and Stanford University.

Two are young which I wrongly identified as *Citula atropos* (Schneider). The larger of the latter shows: Head $3\frac{1}{5}$; depth $1\frac{9}{10}$; D. VIII–I, 21; A. II–I, 17; P. II, 19; V. I, 5; scales 82 in lateral line, and scutes 28; pectoral $1\frac{1}{6}$ in head; ventral $1\frac{1}{3}$; snout $3\frac{1}{4}$, from tip; eye $3\frac{1}{8}$; maxillary $2\frac{1}{6}$; interorbital space $3\frac{1}{3}$. Gill-rakers 7+16, slender and compressed. Color when fresh in arrack pale leaden or slaty-gray on back and upper surface, lower side and under surface white. Body everywhere more or less silvery, especially below. Side with five broad pale gray vertical bars. Spinous dorsal blackish. Dorsal dusky above, other fins except ventral dilute yellowish. Ventral black, deepest distally and basal portions pale.

This species, originally from the Red Sea, has not been compared with Sumatran examples. The latter agree with Cuvier's figure,[28] except that only the first dorsal ray is elongate and the others are not prolonged into filaments. *Caranx cirrhosus* Cuvier[29] also lacks dorsal and anal filaments and an opercular spot. It is also supposed to be identical. Russell's figure of *Tchawil parah*[30] is apparently based on young examples of this species, though much older than my younger ones, as the ventral is represented as short.

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[28] *Olistus malabaricus* Cuvier, Règne Animal, Ed. Pl. Grav., Poiss., 18—, Pl. 58. La mer Rouge.

[29] Ehrenberg, in Cuvier, *Hist. Nat. Poiss.*, IX, 1833, p. 94, Pl. 250.

[30] *Fishes of Coromandel*, II, 1803, p. 38, Pl. 151. Vizagapatam.

### SCYRIS Cuvier.

Règne Animal, Ed. II, II, 1829, p. 209 (*alexandrina*).

**Scyris alexandrina** (St. Hilaire).

*Gallus alexandrinus* Geoffroy St. Hilaire, Faune de Egypt, Zool., 1809, Pl. 22, fig. 2. Egypt. [Text not consulted.]

Head 3; depth $1\frac{1}{2}$; D. I, IV–I, 21; A. I, 18; P. II, 17; V. I, 5; scales about 134 in lateral line, several on base of caudal; mandible $2\frac{9}{10}$ in head; snout $2\frac{1}{2}$, measured from its own tip (not tip of upper jaw); eye $3\frac{3}{5}$; maxillary 3; interorbital space $4\frac{1}{2}$; least depth of caudal peduncle $5\frac{1}{2}$; ventral (damaged) $2\frac{2}{3}$. Gill-rakers 10+25, compressed, longest much longer than longest filaments or a trifle over half of orbit. Pseudobranchiæ equal to filaments. Rather narrow bands of nearly even small teeth in jaws. A small patch of similar ones also on vomer. Orbit $\frac{2}{3}$ depth of preorbital. Length $8\frac{5}{8}$ inches. Two examples from Beirut, Syria.

The original figure is good. *Gallichtys ægyptiacus* Cuvier[31] is probably the young. It is also possible that *Hynnis goreensis* Cuvier,[32] may be different, though suggested as identical by Lütken.[33] The adult of *Hynnis* would differ at all ages in not having the anterior soft dorsal and anal rays produced into filaments.

**Scyris indica** Rüppell.

*Scyris indicus* Rüppell, Atlas zu der Reise im nördlichen Afrika, Zool., 1828, p. 128, Pl. 33, fig. 1. Djetta. (Mus. Francos.)

Head $3\frac{1}{3}$; depth 2; D. I, 19; A. I, 16; P. II, 16; V. I, 5; width of head about 3 in its length; least depth of caudal peduncle $7\frac{1}{2}$; ventral $2\frac{1}{3}$; snout $2\frac{1}{4}$ in head, measured obliquely from tip of upper jaw to upper angle of opercle; eye 4; maxillary 3; interorbital space $4\frac{1}{6}$; pectoral $2\frac{3}{5}$ in body; upper caudal lobe about $3\frac{3}{7}$. Tongue long, narrow, rounded, and free in front, its upper surface finely asperous. Gill-rakers 8+23, short, compressed, broad, and longest about $1\frac{3}{5}$ in longest filament. Filaments 2 in orbit. Pseudobranchiæ about 5 in orbit. Scales developed about shoulder, behind eye, and on base of caudal. A few small scales along bases of soft dorsal and anal in front. First dorsal ray reaching back opposite base of last. Color when fresh in arrack more or less silvery-white, glaucous or slaty-gray on upper surface. Outer edge of membrane between rays of dorsal blackish, and long dorsal lobe dark like outer portions of caudal lobe. A small blackish spot on edge of opercle, and a brown blotch over eye. Length 17 inches. Padang, Sumatra. Alfred C. Harrison, Jr., and Dr. H. M. Hiller. Three examples. Acad. Nat. Sci. Phila. and Stanford University.

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[31] Ehrenberg, in Cuvier, *Hist. Nat. Poiss.*, IX, 1833, p. 131.

[32] *L. c.*, p. 145. Gorée. (M. Rang.)

[33] *Kon. Dansk. Vid. Selsk. Skrift.* (*Spolia Atlantica*), XII, 1880, p. (538–42) 605.

Two are young, much deeper, and also have much longer anterior dorsal and anal rays. Ventral filamentous, reaching base of caudal. When fresh in arrack color was silvery, glaucous or slaty-gray above. Side with six broad bands of darker glaucous fading out below. Outer portions of all prolonged rays of dorsal and anal blackish. Ventral entirely black, other fins pale. They agree perfectly with examples from Cavite, Philippine Islands, in Stanford University, and also with the examples recorded from Formosa as *Alectis ciliaris* by Drs. Jordan and Evermann,[34] as I found when compared.

**Alectis crinitus** (Mitchill).

*Zeus crinitus* Mitchill, Amer. Journ. Sci. Art., XI, 1826, p. 144. Block Island.

Newport (Rhode Island), Key West (Florida), and San Domingo (West Indies).

*Alectis ciliaris* (Bloch),[35] the Indian form, may be different.

**Vomer setapinnis** (Mitchill).

*Zeus setapinnis* Mitchill, Trans. Lit. Philos. Soc. New York, I, 1815, p. 384, Pl. 1, fig. 9. Bay of New York.

*Vomer curtus* Cope, Proc. Acad. Nat. Sci. Phila., 1870, p. 119. North American Atlantic coast, the precise locality not recorded. (Bonaparte Coll., A. N. S. P.)

Head 3; depth $1\frac{1}{12}$; D. ii,IV–I, 23; A. I. 19. Gill-rakers 8+23, compressed, longest about $\frac{2}{3}$ of orbit, and longest filament about $\frac{3}{5}$ of longest raker. Length $9\frac{3}{8}$ inches. West coast of Africa, probably at Gabun river. Dr. J. L. Leconte. Also another with same data, but smaller. It has 25 soft dorsal rays, and would appear to differ from *Vomer dorsalis* only in its greater depth. Dr. Steindachner, who has examined the types of *Vomer goreensis* Guichenot and *Vomer senegalensis* Guichenot, long ago concluded that they were identical with *Vomer setapinnis* (Mitchill).[36] He also pointed out the fact that *Vomer gabonensis* Guichenot represents a distinct species. Panama examples of about $8\frac{1}{2}$ inches in length have the depth about 2, 22 and 23 dorsal and 18 anal rays. Coll. Dr. W. S. W. Ruschenberger. An example from Rio Janeiro, Brazil, about 8⅝ inches long, has depth $1\frac{9}{10}$, 21 dorsal and 17 anal rays. Drs. Ruschenberger and Turner. Examples from Newport, Rhode Island, of same size and smaller, have depth ranging from 1¾ to 2, dorsal with 22 or 23 and anal with 17 or 18 rays. Coll. Samuel Powel. Other examples from Maryland and South Carolina.

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[34] *Proc. U. S. Nat. Mus.*, XXV, 1903, p. 338.

[35] *Zeus ciliaris* Bloch, Naturg. Ausl. Fisch., III (VI), 1787, p. 36, Pl. 191. Suratte. [India.] (Doctor König.) [I have not been able to consult Rafinesque's account of *Alectis* in "*Analyse de la Nature ou Tableau de L'Univers et des Corps Organises*, 1815."]

[36] *Sitz. Ak. Wiss. Wien*, LX, 1869 (1870), p. 706.

Type of *Vomer curtus* Cope from the Atlantic coast of eastern North America is the same. Bonaparte Coll. Dr. T. B. Wilson.

The specific denomination of this fish, though not correctly spelled, had best be adopted.

**Vomer spixii** (Swainson).

*Platysomus spixii* Swainson, Lardner's Cab. Cyclop. Nat. Hist., II, 1839, p. 406. (Based on *Vomer brownii* Agassiz, Sel. Gen. Spec. Pisc. Brasil, 1829, p. 110, Pl. 57. Oceano Atlantico. [Brazil.] (Museo Monacensi.)

Head 2⅔; depth 1½; D. VIII–I, 22; A. I, 18. Gill-rakers 7+27, compressed, longest much longer than filaments or about ⅗ of orbit. Length 7¾ inches. Many from San Domingo (West Indies). Prof. W. M. Gabb. St. Thomas (West Indies), from Henry Warrington.

**Selene vomer** (Linnæus).

*Zeus vomer* Linnæus, Syst. Nat., Ed. X, 1758, p. 266. America.

Surinam, Tobago (British West Indies), San Domingo (West Indies), Fort Macon (North Carolina), Beasley's Point and Squan river (New Jersey). A young example agrees with Lütken's figure.[37] Lat. 20° N., long. 105° W. (southern part of Gulf of Mexico). Dr. William H. Jones.

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[37] *Kon. Dansk. Vid. Selsk. Skrift.* (*Spolia Atlantica*), XII, 1880, Pl. 5, fig. 1.